

WHAT IS CLAIMED IS:

1. A method comprising:

scheduling a sequence of machine-executable instructions;

creating a data layout based on the scheduled sequence of machine-executable instructions.
2. The method of claim 1, wherein the data layout is created in accordance with a colored conflict graph, the colored conflict graph being based on the scheduled sequence of machine-executable instructions.
3. The method of claim 2, wherein the colored conflict graph comprises:

a plurality of nodes, each corresponding to a unique data element accessed by one or more of the machine-executable instructions, and each of the plurality of nodes being assigned a color, each color representing a hardware resource; and

a number of edges, wherein each edge, if any, represents a potential hardware resource conflict.
4. The method of claim 3, wherein the hardware resource comprises a data bank in a cache memory.
5. The method of claim 4, wherein the hardware resource conflict comprises a plurality of the one or more machine-executable instructions accessing the data bank in a same execution cycle.
6. The method of claim 4, wherein each edge that connects a pair of nodes that are assigned a same color represents a hardware resource conflict.

7. A method comprising:
- creating a conflict graph having a plurality of nodes and a number of edges, each node representing a data element accessed by at least one machine-executable instruction, and each edge, if any, connecting a pair of the plurality of nodes, and representing a potential hardware resource conflict;
- coloring the conflict graph to generate a colored conflict graph by assigning a color to each of the plurality of nodes, each color representing a hardware resource; and
- creating a data layout by mapping each data element to a memory location, the memory location mapping to a corresponding hardware resource.
8. The method of claim 7, wherein said assigning a color to each of the plurality of nodes comprises, for a given node of each of the plurality of nodes, assigning a color from a corresponding color set, the corresponding color set comprising at least one color from a community color set having a plurality of colors, the at least one color not being in one or more other color sets, the one or more other color sets corresponding to one or more nodes adjacent to the given node.
9. The method of claim 8, wherein, for each given node of the plurality of nodes, said assigning a color from the corresponding color set comprises:
- designating the given node as a first node, the first node being an uncolored node, and corresponding to a first corresponding color set;
- if the first corresponding color set is not empty, assigning a first color from the first corresponding color set to the first node; and
- if there are one or more second nodes, the one or more second nodes being uncolored and adjacent to the first node, and corresponding to one or more second corresponding color sets, removing the first color from each of the one or more second corresponding color sets.

10. The method of claim 9, wherein if the first corresponding color set is empty, selecting one of the plurality of colors from the community color set.
11. The method of claim 10, wherein the selected color of the plurality of colors is a least-weighted conflict color.
12. The method of claim 9, wherein the first color is a color that minimizes memory usage.
13. The method of claim 12, wherein a color that minimizes memory usage comprises a color corresponding to a data size that is not divisible by a block size.
14. The method of claim 7, additionally comprising assigning a priority to each of the plurality of nodes.
15. The method of claim 14, wherein said assigning a priority to each of the plurality of nodes comprises, for a given node of each of the plurality of nodes:

determining a weight for each of the one or more edges connected to the given node;

assigning to each node a priority corresponding to a greatest weight of the node's one or more edges connected to the node; and

ranking the plurality of nodes.
16. The method of claim 15, wherein said determining the weight to a given one of each of the one or more edges connected to the node comprises determining the weight based on a performance penalty associated with a hardware resource conflict represented by the given edge.
17. The method of claim 14, wherein said assigning a color to each of the plurality of nodes comprises assigning a color to each of the plurality of nodes in order of a corresponding priority assigned to each of the nodes.

18. The method of claim 17, wherein the hardware resource comprises a data bank, and the hardware resource conflict comprises a plurality of the at least one machine-executable instruction accessing the data bank in a same execution cycle.
19. An apparatus comprising:
- circuitry capable of:
- creating a conflict graph having a plurality of nodes and a number of edges, each node representing a data element accessed by at least one machine-executable instruction, and each edge, if any, connecting a pair of the plurality of nodes, and representing a potential hardware resource conflict;
- coloring the conflict graph to generate a colored conflict graph by assigning a color to each of the plurality of nodes, each color representing a hardware resource; and
- creating a data layout by mapping each data element to a memory location, the memory location mapping to a corresponding hardware resource.
20. The apparatus of claim 19, wherein said circuitry is additionally capable of assigning a color from a corresponding color set, the corresponding color set comprising at least one color from a community color set having a plurality of colors, the at least one color not being in one or more other color sets, the one or more other color sets corresponding to one or more nodes adjacent to the given node.

21. The apparatus of claim 20, wherein, for each given node of the plurality of nodes, said circuitry is capable of:

designating the given node as a first node, the first node being an uncolored node, and corresponding to a first corresponding color set;

if the first corresponding color set is not empty, assigning a first color from the first corresponding color set to the first node; and

if there are one or more second nodes, the one or more second nodes being uncolored and adjacent to the first node, and corresponding to one or more second corresponding color sets, removing the first color from each of the one or more second corresponding color sets.

22. The apparatus of claim 19, wherein said circuitry is additionally capable of assigning a priority to each of the plurality of nodes.

23. A system comprising:

a memory having a sequence of machine-executable instructions that access a plurality of data elements in one or more memory locations;

an L2 (level 2) cache having a plurality of data banks, each of the one or more memory locations mapping to one of the plurality of data banks; and

circuitry capable of:

creating a conflict graph having a plurality of nodes and a number of edges, each node representing a data element accessed by at least one machine-executable instruction, and each edge, if any, connecting a pair of the plurality of nodes, and representing a potential data bank conflict;

coloring the conflict graph to generate a colored conflict graph by assigning a color to each of the plurality of nodes, each color representing a data bank; and

creating a data layout by mapping each data element to a memory location, the memory location mapping to a corresponding data bank.

24. The system of claim 23, wherein said circuitry is additionally capable of assigning a color from a corresponding color set, the corresponding color set comprising at least one color from a community color set having a plurality of colors, the at least one color not being in one or more other color sets, the one or more other color sets corresponding to one or more nodes adjacent to the given node.
25. The system of claim 24, wherein, for each given node of the plurality of nodes, said circuitry is additionally capable of:

designating the given node as a first node, the first node being an uncolored node, and corresponding to a first corresponding color set;

if the first corresponding color set is not empty, assigning a first color from the first corresponding color set to the first node; and

if there are one or more second nodes, the one or more second nodes being uncolored and adjacent to the first node, and corresponding to one or more second corresponding color sets, removing the first color from each of the one or more second corresponding color sets.
26. The system of claim 24, wherein said circuitry is additionally capable of assigning a priority to each of the plurality of nodes.

27. A machine-readable medium having stored thereon data representing sequences of instructions, the sequences of instructions which, when executed by a machine, result in the machine performing the following:

creating a conflict graph having a plurality of nodes and a number of edges, each node representing a data element accessed by at least one machine-executable instruction, and each edge, if any, connecting a pair of the plurality of nodes, and representing a potential hardware resource conflict;

coloring the conflict graph to generate a colored conflict graph by assigning a color to each of the plurality of nodes, each color representing a hardware resource; and

creating a data layout by mapping each data element to a memory location, the memory location mapping to a corresponding hardware resource.

28. The machine-readable medium of claim 27, wherein said sequences of instructions which, when executed by the machine, result in the machine assigning a color to each of the plurality of nodes additionally results in, for a given node of each of the plurality of nodes, assigning a color from a corresponding color set, the corresponding color set comprising at least one color from a community color set having a plurality of colors, the at least one color not being in one or more other color sets, the one or more other color sets corresponding to one or more nodes adjacent to the given node.
29. The machine-readable medium of claim 27, wherein said sequences of instructions, when executed by the machine, result in the machine assigning a color from the corresponding color set additionally result in, for each give node of the plurality of nodes, the machine:
- designating the given node as a first node, the first node being an uncolored node, and corresponding to a first corresponding color set;
 - if the first corresponding color set is not empty, assigning a first color from the first corresponding color set to the first node; and

if there are one or more second nodes, the one or more second nodes being uncolored and adjacent to the first node, and corresponding to one or more second corresponding color sets, removing the first color from each of the one or more second corresponding color sets.

30. The machine-readable medium of claim 27, wherein said circuitry is additionally capable of assigning a priority to each of the plurality of nodes.